

**A METHOD OF DETERMINING SHAPE DATA****ABSTRACT**

5 A reference template is used to help in the reconstruction of a damaged workpiece,  
such as a turbine blade. The reference template is a copy of the workpiece from before  
it was used. The reference template is scanned in layers, including the portion  
corresponding to that which has been damaged in the workpiece, as well as adjacent  
undamaged portions. The adjacent undamaged portions of the workpiece are also  
10 scanned as layers. Profiles of the layers of the reference template and workpiece are  
generated, based on the scans. Sets of offsets are then determined based on  
corresponding points within adjacent scanned layers in the undamaged portion of the  
workpiece and the corresponding portion of the reference template and also within the  
portion of the reference template corresponding to the damaged portion of the  
15 workpiece. A new set of offsets is then calculated between the undamaged and  
damaged portions of the workpiece, based on these various sets of offsets, to predict a  
profile of a layer of the damaged portion. This calculated set of offsets is then used to  
calculate further profiles until a complete profile of the damaged portion has been  
predicted.

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**FIG. 12**